

U.S. Environmental Protection Agency Region 8 Technical and Management Services

Laboratory Services Program

Certificate of Analysis

Ref: 8TMS-L

MEMORANDUM

Date: 08/12/15

Subject: Analytical Results--- Upper Animas_Surface Water 3_AUG 2015_A096 / A-098

From: Don Goodrich; EPA Region8 Analytical Chemistry WAM

To: Paula Schmittdiel

Superfund

8 EPR-SR

Received Sample Set(s), [Work Order: Date Received]:

[C150803 : 08/11/2015]

Attached are the analytical results for the samples received from the Upper Animas_Surface Water 3_AUG 2015_A096 sampling event, according to TDF A-098. All analyses were performed within their method specified holding times unless otherwise noted in the following narrative.

These samples were prepared, analyzed, and verified by the Environmental Services Assistance Team Laboratory (ESAT) according to the requirements of the Technical Direction Form(TDF).

Note: The laboratory herewith transmits this deliverable to the program/project partner for determination of "final data usability" which may include data validation and data quality assessment per and in accordance with EPA QA/G-8, *Guidance on Environmental Data Verification and Data Validation*, November 2002, EPA/240/R-02/004. Laboratory data qualifiers are applied based on the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004, referred to as "NFGI".

Laboratory policy is to dispose of any remaining sample 60 days after data analysis packages are delivered to EPA. If you would like the laboratory to retain the samples for a period longer than 60 days, please contact Don Goodrich within the 60 day period at (303) 312-6687.

Project Name:

A-098

Case Narrative

C150803

Quality Assessment Unless indicated by exception, the QA/QC associated with this sample set produced data within the TDF-specified criteria.

Holding Times: All samples were analyzed within their method-specified technical holding time(s). Dissolved metals were preserved at time of receipt at the laboratory and were analyzed prior to the 24 hour wait period. No qualifiers were assigned.

- 1. Initial and Continuing calibration blanks (ICBs and CCBs).
 - Exceptions: None.
- 2. Preparation (PB) / Method blanks (MB)

Exceptions: In ICP-OE batch 1508070, manganese was detected in the prep blank at a level less than ten times the concentration found in samples. No qualifiers were assigned. In TDS batch 1508064, preparation blank was greater than the RL but less than 4x, as a results the RL and MDL was raised to 25 mg/L. All other QC was within limits, no qualifiers were assigned.

- Interference Checks (ICSA / ICSAB) for ICP-MS and ICP-OE analyses only. Exceptions: None.
- Initial and Continuing calibration verification analyses (ICVs, SCVs and CCVs). Exceptions: None.
- Laboratory Control Sample (LCS) or second source analysis or SRM. Exceptions: None.
- Laboratory Fortified blank (LFB) / Blank spike (BS), same source as used for the matrix spikes.
 PBS performed with analyses/methods requiring preparation or digestion prior to analysis.
 Exceptions: None.
- Contract Reporting Detection Limit Standard, labeled as CRA, CRDL or CRL. Exceptions: None.
- Laboratory Duplicate (DUP). "Source" identifies field sample duplicated in the laboratory. If either
 the "source" or the duplicate result is <5X the reporting limit, the %D limit of 20% does not apply.
 Exceptions: None.
- 9. Laboratory Matrix Spike (MS) and spike duplicate (MSD). "Source" defines original field sample fortified prior to analysis. Percent recovery (%R) limits do not apply when sample concentration(s) exceed the corresponding analyte spike level by a factor of 4 or greater. Exceptions: None.
- 10. Serial Dilution sample analysis (SRD). "Source" is parent field sample diluted 1:5 in the laboratory. Performed for ICP-OE and ICP-MS metals analyses. Percent difference (%D) limits do not apply when analyte concentration(s) are below 50x the source sample's MDL (or 10x it's PQL). Exceptions: None.
- 11. Internal standards, criteria specified for ICP-MS analyses only, monitored at the instrument. Exceptions: None.
- 12. Any calibration using more than two-points produced a correlation coefficient equal to or greater than 0.995.

Exceptions: None.

TDF#: A-098

Acronyms and Definitions:

Project Name:

- ESAT Environmental Services Assistance Team
 - J Data Estimated qualifier (also applied to all data less than PQL, greater than or equal to MDL)
- MDL Method Detection Limit
- PQL Practical Quantitation Limit, also known as reporting limit.
- RPD Relative Percent Difference (difference divided by the mean)
- %D Percent difference, serial dilution criteria unit, difference divided by the original result
- %R Percent recovery, analyzed (less sample contribution) divided by true value
- < Analyte NOT DETECTED at or above the Method Detection Limit(MDL)</p>
- mg/L Parts per million (millligrams per liter). Solids equivalent = mg/Kg.
- ug/L Parts per billion (micrograms per liter). Solids equivalent = ug/Kg.
- NR No Recovery (matrix spike) Often seen for calcium/magnesium when their concentration exceeds the spike level by > 4x.
- NFGI USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data ReviewOctober 2004
- RE Sample Re-analysis. Usually seen on raw data and sequences for required sample dilutions due to over-range analytes.
- U Analyte not detected at or above MDL qualifier
- D Diluted value qualifier.

M ethod(s) Summary

As defined in the Technical Direction Form (TDF), some or all of the m ethods listed below were used for the determination of the reported target analytes.

From EPA's Methods for the Determination of Metals in Environmental Samples, Supplement I, May 1994, dissolved, total, and/or total recoverable metals were determined by:

- M ethod 200.7 / 6010B using a PE Optima ICP OE (ICP)
- M ethod 200.8 / 6020 using a Perkin -Elmer Elan 6000 ICP -MS.
- M ethod 200.2 for total recoverable metals (only) dige stion.
- M ethod 245.1 using a Perkin -Elmer FIM S CV AA (aqueous mercury only).

From Standard M ethods for the Examination of Water and Wastewater , 18 th Edition, 1992, M ethod 2340B was used for the calculated hardness determ ination. Hardness is reported as mg (milligram) equivalent CaCO ₃ per liter (L) determined as follows:

Calculated hardness = 2.497 * (Calcium, mg/L) + 4.118 * (Magnesium, mg/L).

From EPA's Test Methods for Evaluating Solid Waste, Physical/Chemical M ethods, SW -846,

- M ethod 3015A was used for microwave assisted total metals digestion.
- M ethod 747 3 w as used for mercury in solids

From EPA's Determ ination of Inorganic Anions by Ion Chromatography , Revision 2.1, 1993, Method 300.0 was used to determ ine the anions.

From EPA's Methods for C hem ical Analysis of W ater and Wastes , M arch 1983:

- M ethod 310.1 was followed for the alkalinity determination.
- M ethod 160.1 was followed for gravimetric total dissolved solids (TDS) determination.
- M ethod 160.2 was used for gravim etric total suspended sol ids (TSS) determination.
- M ethod 415.3 was used for total organic carbon (TOC) determination using either an Apollo 9000 or Phoenix 8000
 Non -D ispersive IR (N DIR) system. Also known as dissolved organic carbon (D OC) when performed on the dissolved sample fr action.

The quality control procedures listed in the TDF request were utilized by ESAT to verify accuracy of the results and to evaluate any matrix interferences.

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TDF #: A-098

Project Name:

Metals (Dissolved) by EPA 200/7000 Series Methods

EPA Tag No: Matrix: Surface Water Lab Number: C150803-02 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	91.3		ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	51500		ug/L	100	1	08/11/2015	sv	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	SV	1508062
200.7	Magnesium	7560		ug/L	100	1	08/11/2015	sv	1508062
200.7	Manganese	67.8		ug/L	2.00	1	08/11/2015	sv	1508062
200.7	Potassium	1880		ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	10700		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	< 20.0	U	ug/L	10.0	1	08/11/2015	SV	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	41.9		ug/L	5.00	1	08/11/2015	SV	1508063
200.8	Cadmium	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Chromium	3.92		ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	0.276		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	1.87		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	< 1.00	U	ug/L	0.500	1	08/11/2015	sv	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	sv	1508063
200.8	Silver	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	160		mg/L	2	1	08/11/2015	SV	1508062

Project Name:

Metals (Dissolved) by EPA 200/7000 Series Methods

A-098

Station ID: GKMSW02_081015 **Date / Time Sampled:** 08/10/15 10:36 **Workorder:** C150803

EPA Tag No: Matrix: Surface Water Lab Number: C150803-05 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	56.6		ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	36700		ug/L	100	1	08/11/2015	sv	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	sv	1508062
200.7	Magnesium	4510		ug/L	100	1	08/11/2015	sv	1508062
200.7	Manganese	401		ug/L	2.00	1	08/11/2015	sv	1508062
200.7	Potassium	718	J	ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	2000		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	85.6		ug/L	10.0	1	08/11/2015	sv	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	32.1		ug/L	5.00	1	08/11/2015	sv	1508063
200.8	Cadmium	0.535		ug/L	0.100	1	08/11/2015	sv	1508063
200.8	Chromium	2.09		ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	1.65		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	3.16		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	sv	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	0.551	J	ug/L	0.500	1	08/11/2015	sv	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	sv	1508063
200.8	Silver	0.736	J	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	sv	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	110		mg/L	2	1	08/11/2015	sv	1508062

TDF#: A-098

Project Name:

Metals (Dissolved) by EPA 200/7000 Series Methods

Station ID: GKMSW04_081015 **Date / Time Sampled:** 08/10/15 11:47 **Workorder:** C150803

EPA Tag No: Matrix: Surface Water Lab Number: C150803-08

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	29.8	J	ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	52200		ug/L	100	1	08/11/2015	SV	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	SV	1508062
200.7	Magnesium	7210		ug/L	100	1	08/11/2015	SV	1508062
200.7	Manganese	136		ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Potassium	1850		ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	10300		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	54.5		ug/L	10.0	1	08/11/2015	SV	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	43.0		ug/L	5.00	1	08/11/2015	SV	1508063
200.8	Cadmium	0.195	J	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Chromium	4.50		ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	0.541		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	2.23		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Silver	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	160	J	mg/L	2	1	08/11/2015	SV	1508062

TDF #: A-098

Project Name:

Metals (Dissolved) by EPA 200/7000 Series Methods

 Station ID:
 GKMSW05_081015
 Date / Time Sampled:
 08/10/15 12:37
 Workorder:
 C150803

EPA Tag No: Matrix: Surface Water Lab Number: C150803-11

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	40.9	J	ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	52200		ug/L	100	1	08/11/2015	SV	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	SV	1508062
200.7	Magnesium	7300		ug/L	100	1	08/11/2015	SV	1508062
200.7	Manganese	111		ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Potassium	1840		ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	10300		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	24.4		ug/L	10.0	1	08/11/2015	SV	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	43.8		ug/L	5.00	1	08/11/2015	SV	1508063
200.8	Cadmium	0.133	J	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Chromium	4.47		ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	0.450		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	1.91		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Silver	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	160	J	ug/∟ mg/L	2	1	08/11/2015	SV	1508062

TDF#: A-098

Project Name:

Metals (Dissolved) by EPA 200/7000 Series Methods

 Station ID:
 GKMSW11_080915
 Date / Time Sampled:
 08/09/15 09:40
 Workorder:
 C150803

EPA Tag No: Matrix: Surface Water Lab Number: C150803-14 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	< 50.0	U	ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	48900		ug/L	100	1	08/11/2015	SV	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	SV	1508062
200.7	Magnesium	5040		ug/L	100	1	08/11/2015	SV	1508062
200.7	Manganese	1620		ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Potassium	1370		ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	3290		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	804		ug/L	10.0	1	08/11/2015	SV	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	38.1		ug/L	5.00	1	08/11/2015	SV	1508063
200.8	Cadmium	2.93		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Chromium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	4.79		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	2.91		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	2.97		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Silver	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	143		mg/L	2	1	08/11/2015	SV	1508062

[&]quot;J" Qualifier indicates an estimated value

TDF #: A-098

Project Name:

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW01_081015 **Date / Time Sampled:** 08/10/15 13:17 **Workorder:** C150803

EPA Tag No: Matrix: Surface Water Lab Number: C150803-01 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	232		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	53800		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	489		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	7740		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	90.6		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	1960		ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	11100		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	34.4		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	42.8	J	ug/L	25.0	5	08/11/2015	sv	1508070
200.8	Cadmium	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	4.81	J	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	5.93		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Nickel	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Thallium	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Vanadium	< 15.0	U	ug/L	10.0	5	08/11/2015	SV	1508070

TDF #: A-098

Project Name:

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW02_081015 **Date / Time Sampled:** 08/10/15 10:36 **Workorder:** C150803

EPA Tag No: Matrix: Surface Water Lab Number: C150803-04

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	771		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	35100		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	1710		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	4590		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	404		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	852	J	ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	2150		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	187		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	30.6	J	ug/L	25.0	5	08/11/2015	sv	1508070
200.8	Cadmium	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	1.67		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	23.5		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	10.9		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	sv	1508070
200.8	Nickel	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Thallium	17.8		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Vanadium	< 15.0	U	ug/L	10.0	5	08/11/2015	SV	1508070

Project Name: TDF #:

A-098

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW04_081015 EPA Tag No:

Date / Time Sampled: Matrix: Surface Water 08/10/15 11:47

Workorder: C150803

Lab Number:

C150803-07

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	362		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	50600		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	884		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	7290		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	152		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	1950		ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	11000		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	80.0		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	43.0	J	ug/L	25.0	5	08/11/2015	SV	1508070
200.8	Cadmium	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	7.20		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	9.17		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Nickel	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070

200.8

200.8

Thallium

Vanadium

3.48

< 15.0

J

U

ug/L

ug/L

2.50

10.0

5

5

08/11/2015

08/11/2015 SV

SV

1508070

1508070

TDF #: A-098

Project Name:

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW05_081015 **Date / Time Sampled:** 08/10/15 12:37 **Workorder:** C150803

EPA Tag No: Matrix: Surface Water Lab Number: C150803-10 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	218		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	51100		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	547		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	7260		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	121		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	1860		ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	10400		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	58.0		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	43.3	J	ug/L	25.0	5	08/11/2015	SV	1508070
200.8	Cadmium	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	5.26		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	5.89		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Nickel	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Thallium	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Vanadium	< 15.0	U	ug/L	10.0	5	08/11/2015	SV	1508070

TDF#: A-098

Project Name:

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW11_080915 Date / Time Sampled: 08/09/15 09:40 Workorder: C150803

EPA Tag No: Matrix: Surface Water Lab Number: C150803-13

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
200.7	Aluminum	309		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	49200		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	731		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	5100		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	1660		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	1480		ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	3340		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	803		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	35.6	J	ug/L	25.0	5	08/11/2015	SV	1508070
200.8	Cadmium	2.92		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	4.72		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	7.37		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	12.1		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Nickel	2.66	J	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	sv	1508070
200.8	Thallium	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Vanadium	< 15.0	U	ug/L	10.0	5	08/11/2015	SV	1508070

[&]quot;J" Qualifier indicates an estimated value

Certificate of Analysis

Upper Animas_Surface Water 3_AUG 2015_A096 **Project Name:**

TDF#: A-098

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSW01 081015 Date / Time Sampled: 08/10/15 13:17

EPA Tag No: Matrix: Surface Water Workorder: C150803

Lab Number: C150803-01

Certificate of Analysis

Α

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
245.1	Mercury	< 0.100	U	ug/L	0.0500	1	08/11/2015	NP	1508071

Mercury only (Total) by EPA 245.1 / 7470A Method

GKMSW02 081015 Station ID: **EPA Tag No:**

Date / Time Sampled: Matrix: Surface Water

08/10/15 10:36

C150803 Workorder:

Lab Number: C150803-04

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
245.1	Mercury	< 0.100	U	ug/L	0.0500	1	08/11/2015	NP	1508071

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSW04 081015

EPA Tag No:

EPA Tag No:

Date / Time Sampled: Matrix: Surface Water

08/10/15 11:47

Workorder:

Lab Number:

C150803

C150803-07

Dilution MDL Method Parameter Analyzed Ву Batch Results Qualifier Units **Factor** 245.1 Mercury 08/11/2015 NP 1508071 U 0.0500 < 0.100 ug/L

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSW05 081015

Date / Time Sampled: Matrix: Surface Water

08/10/15 12:37

Workorder: Lab Number: C150803

C150803-10

Dilution MDL Method **Batch** Parameter Analyzed By Results Qualifier Units Factor 245.1 08/11/2015 NP 1508071 Mercury 1 U < 0.100 ug/L 0.0500

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF#:

A-098

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: EPA Tag No:

Station ID: GKMSW11_080915

Date / Time Sampled: Matrix: Surface Water

08/09/15 09:40

Workorder:

C150803

Lab Number:

C150803-13 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
245.1	Mercury	< 0.100	U	ug/L	0.0500	1	08/11/2015	NP	1508071

[&]quot;J" Qualifier indicates an estimated value

TDF#: A-098

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW01_081015 EPA Tag No: Date / Time Sampled: 08/ Matrix: Surface Water

08/10/15 13:17 Workord

Workorder: C150803

Lab Number:

C150803-03 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
150.1	рН	7.56		pH Units		1	08/11/2015	SW	1508067
EPA 160.1	Total Dissolved Solids	270		mg/L	25	1	08/12/2015	SW	1508064
EPA 160.2	Total Suspended Solids	< 10		mg/L	10	1	08/12/2015	SW	1508065
EPA 310.1	Total Alkalinity	82.4		mg CaCO3 / L	5.00	1	08/11/2015	SW	1508066

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW02_081015 EPA Tag No: Date / Time Sampled:

08/10/15 10:36

Workorder:

C150803

Matrix:

Surface Water

Lab Number:

C150803-06

Α

MDL Dilution Analyzed Method **Parameter** Ву Batch Qualifier Results Units Factor 7.51 SW 1508067 150.1 рΗ pH Units 1 08/11/2015 SW EPA 160.1 Total Dissolved 176 mg/L 25 1 08/12/2015 1508064 Solids Total Suspended EPA 160.2 1 08/12/2015 SW 1508065 < 10 mg/L 10 Solids **Total Alkalinity** 36.2 mg CaCO3 / L 5.00 1 EPA 310.1 08/11/2015 SW 1508066

TDF#: A-098

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW04_081015 EPA Tag No: Date / Time Sampled: Matrix: Surface Water 08/10/15 11:47

Workorder: C1 Lab Number:

C150803

C150803-09

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
150.1	рН	7.15		pH Units		1	08/11/2015	SW	1508067
EPA 160.1	Total Dissolved Solids	266		mg/L	25	1	08/12/2015	SW	1508064
EPA 160.2	Total Suspended Solids	< 10		mg/L	10	1	08/12/2015	SW	1508065
EPA 310.1	Total Alkalinity	80.7		mg CaCO3 / L	5.00	1	08/11/2015	SW	1508066

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW05_081015

Date / Time Sampled:

08/10/15 12:37

Workorder: C150

C150803

EPA Tag No:

Matrix: Surface Water

Lab Number:

C150803-12

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
150.1	рН	7.19		pH Units		1	08/11/2015	SW	1508067
EPA 160.1	Total Dissolved Solids	264		mg/L	25	1	08/12/2015	SW	1508064
EPA 160.2	Total Suspended Solids	< 10		mg/L	10	1	08/12/2015	SW	1508065
EPA 310.1	Total Alkalinity	81.8		mg CaCO3 / L	5.00	1	08/11/2015	SW	1508066

TDF #: A-098

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW11_080915 EPA Tag No:

Date / Time Sampled: Matrix: Surface Water

08/09/15 09:40

Workorder: C Lab Number:

C150803

C150803-15 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	Ву	Batch
150.1	рН	6.69		pH Units		1	08/11/2015	SW	1508067
EPA 160.1	Total Dissolved Solids	254		mg/L	25	1	08/12/2015	SW	1508064
EPA 160.2	Total Suspended Solids	< 10		mg/L	10	1	08/12/2015	SW	1508065
EPA 310.1	Total Alkalinity	12.4		mg CaCO3 / L	5.00	1	08/11/2015	SW	1508066

[&]quot;J" Qualifier indicates an estimated value

TDF#: A-098

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	% D or RPD	%Dor RPD Limit
ICPMS-PE DRC-I	1								
Batch 1508063 - No	Lab Prep Reqd		Water					ICP	/IS-PE DRC-II
Method Blank (1508)	063-BLK1)	Dilution Factor: 1				Prepar	red & Analyz	red: 08/11/15	
Vanadium	< 2.00	3.00	ug/L						
Chromium	< 1.00	2.00	п						
Cobalt	< 0.100	0.200	п						
Nickel	< 0.500	1.00	п						
Copper	< 0.500	1.00	н						
Arsenic	< 0.500	2.00	н						
Selenium	< 1.00	2.00	н						
Molybdenum	< 1.00	1.00	"						
Silver	< 0.500	1.00	"						
Cadmium	< 0.100	0.200	"						
Antimony	< 0.500	1.00	"						
, Barium	< 5.00	10.0	n						
Thallium	< 0.500	1.00	п						
Lead	< 0.100	0.200	n						
Method Blank Spike	(1508063-BS1)	Dilution Factor:	1			Prepar	red & Analyz	ted: 08/11/15	
Vanadium	96.1	3.00	ug/L	100		96	85-115		
Chromium	95.5	2.00	я	100		96	85-115		
Cobalt	94.3	0.200	"	100		94	85-115		
Nickel	95.0	1.00	"	100		95	85-115		
Copper	94.0	1.00	я	100		94	85-115		
• •	92.6	2.00	я	100		93	85-115		
Arsenic									
	491	2.00	я	500		98	85-115		
Selenium			# #	500 100		98 93	85-115 85-115		
Selenium Molybdenum	491	2.00							
Arsenic Selenium Molybdenum Silver Cadmium	491 93.3	2.00 1.00	п	100		93	85-115		
Selenium Molybdenum Silver	491 93.3 93.9	2.00 1.00 1.00	п	100 100		93 94	85-115 85-115		
Selenium Molybdenum Silver Cadmium Antimony	491 93.3 93.9 95.5	2.00 1.00 1.00 0.200	n n	100 100 100		93 94 96	85-115 85-115 85-115		
Selenium Molybdenum Silver Cadmium	491 93.3 93.9 95.5 97.6	2.00 1.00 1.00 0.200 1.00	п п п	100 100 100 100		93 94 96 98	85-115 85-115 85-115 85-115		

A-098

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	% D or RPD	%D or RPD Limit
Batch 1508063 - No	o Lab Prep Reqd	ν	Vater					ICPM	IS-PE DRC-II
Duplicate (1508063-I	OUP1)	Dilution Factor: 1	Source	: C150803-0)2	Prepa	red & Analyz	ed: 08/11/15	
Vanadium	< 2.00	3.00	ug/L		< 2.00				20
Chromium	4.07	2.00	я		3.92			4	20
Cobalt	0.238	0.200	я		0.276			15	20
Nickel	< 0.500	1.00	я		< 0.500				20
Copper	1.92	1.00	**		1.87			3	20
Arsenic	< 0.500	2.00	**		< 0.500				20
Selenium	< 1.00	2.00	н		< 1.00				20
Molybdenum	< 1.00	1.00	н		< 1.00				20
Silver	< 0.500	1.00	н		< 0.500				20
Cadmium	< 0.100	0.200	н		< 0.100				20
Antimony	< 0.500	1.00	н		< 0.500				20
Barium	42.3	10.0	н		41.9			1	20
Thallium	< 0.500	1.00	н		< 0.500				20
Lead	< 0.100	0.200	п		< 0.100				20
Matrix Spike (15080	63-MS1)	Dilution Factor: 1	Source	: C150803-0)2	Prepa	red & Analyz	ed: 08/11/15	
Vanadium	94.3	3.00	ug/L	100	< 2.00	94	70-130		
Chromium	94.5	2.00	"	100	3.92	91	70-130		
Cobalt	89.9	0.200	я	100	0.276	90	70-130		
Nickel	87.9	1.00	я	100	< 0.500	88	70-130		
Copper	90.9	1.00	"	100	1.87	89	70-130		
Arsenic	101	2.00	н	100	< 0.500	101	70-130		
Selenium	543	2.00	я	500	< 1.00	109	70-130		
Molybdenum	94.8	1.00	я	100	< 1.00	95	70-130		
Silver	88.6	1.00	91	100	< 0.500	89	70-130		
Cadmium	96.1	0.200	91	100	< 0.100	96	70-130		
Antimony	101	1.00	**	100	< 0.500	101	70-130		
Barium	138	10.0	**	100	41.9	96	70-130		
Thallium	93.4	1.00	я	100	< 0.500	93	70-130		
Lead	92.4	0.200	н	100	< 0.100	92	70-130		

A-098

Metals (Dissolved) by EPA 200/7000 Series Methods - Quality Control TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	% D or RPD	%D or RPD Limit
Batch 1508069 - 150	08063	V	/ater					ICPI	MS-PE DRC-II
Serial Dilution (15080	069-SRD1)	Dilution Factor: 5	Source	: C150803-0	2	Prepar	ed & Analyz	ed: 08/11/15	
Vanadium	< 10.0	15.0	ug/L		< 2.00				10
Chromium	< 5.00	10.0	я		3.92				10
Cobalt	< 0.500	1.00	п		0.276				10
Nickel	< 2.50	5.00	п		< 0.50				10
Copper	< 2.50	5.00	н		1.87				10
Arsenic	< 2.50	10.0	п		< 0.50				10
Selenium	< 5.00	10.0	н		< 1.00				10
Molybdenum	< 5.00	5.00	п		< 1.00				10
Silver	< 2.50	5.00	п		< 0.50				10
Cadmium	< 0.500	1.00	п		< 0.10				10
Antimony	< 2.50	5.00	п		< 0.50				10
Barium	41.1	50.0	п		41.9			2	10
Thallium	< 2.50	5.00	п		< 0.50				10
Lead	< 0.500	1.00	п		< 0.10				10

ICPOE - PE Optima

Batch 1508062 - N	lo Lab Prep Reqd		Water	ICPOE - PE Optima
Method Blank (1508	8062-BLK1)	Dilution Factor	: 1	Prepared & Analyzed: 08/11/15
Aluminum	< 20.0	50.0	ug/L	
Beryllium	< 2.00	5.00	н	
Calcium	< 100	250	я	
Iron	< 100	250	я	
Potassium	< 250	1000	я	
Magnesium	< 100	250	я	
Manganese	< 2.00	5.00	н	
Sodium	< 250	1000	н	
Zinc	< 10.0	20.0	п	

A-098

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	% D or RPD	%D or RPD Limit
Batch 1508062 - No La	ab Prep Reqd	И	Vater					ICPOE	E - PE Optima
Method Blank Spike (15	08062-BS1)	Dilution Factor: 1				Prepa	red & Analyz	red: 08/11/15	
Aluminum	10130	50.0	ug/L	10100		100	85-115		
Beryllium	99.41	5.00	"	100		99	85-115		
Calcium	10080	250	я	10100		100	85-115		
Iron	10150	250	н	10100		100	85-115		
Potassium	10300	1000	н	10100		102	85-115		
Magnesium	10140	250	#1	10100		100	85-115		
Manganese	98.18	5.00	н	100		98	85-115		
Sodium	10170	1000	н	10100		101	85-115		
Zinc	102.1	20.0	п	100		102	85-115		
Duplicate (1508062-DUF	21)	Dilution Factor: 1	Source	: C150803-0	2	Prepa	red & Analyz	ed: 08/11/15	
Aluminum	71.30	50.0	ug/L		91.31			25	20
Beryllium	< 2.00	5.00	"		< 2.00				20
Calcium	51750	250	n		51470			0.5	20
Iron	< 100	250	n		< 100				20
Potassium	1902	1000	**		1878			1	20
Magnesium	7562	250	п		7559			0.05	20
Manganese	68.39	5.00	н		67.80			0.9	20
Sodium	10660	1000	я		10670			0.2	20
Zinc	< 10.0	20.0	я		< 10.0				20
Matrix Spike (1508062-I	MS1)	Dilution Factor: 1	Source	: C150803-0	2	Prepa	red & Analyz	ed: 08/11/15	
Aluminum	10110	50.0	ug/L	10100	91.31	99	70-130		
Beryllium	98.84	5.00	"	100	< 2.00	99	70-130		
Calcium	60080	250	н	10100	51470	85	70-130		
Iron	10050	250	я	10100	< 100	99	70-130		
Potassium	12080	1000	я	10100	1878	101	70-130		
Magnesium	17280	250	я	10100	7559	96	70-130		
Manganese	164.7	5.00	я	100	67.80	97	70-130		
Sodium	20560	1000	н	10100	10670	98	70-130		
Zinc	104.2	20.0	н	100	< 10.0	104	70-130		

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Metals (Dissolved) by EPA 200/7000 Series Methods - Quality Control TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%Dor RPD	%D or RPD Limit
Batch 1508068 - 15	08062	V	Water					ICPO	E - PE Optima
Serial Dilution (1508	068-SRD1)	Dilution Factor: 5	Source	e: C150803-0)2	Prepa	red & Analyz	red: 08/11/15	
Aluminum	< 100	250	ug/L		91.31				10
Beryllium	< 10.0	25.0	н		< 2.00				10
Calcium	50400	1250	я		51470			2	10
Iron	< 500	1250	н		< 100.00				10
Potassium	1866	5000	н		1878			0.6	10
Magnesium	7406	1250	п		7559			2	10
Manganese	67.26	25.0	н		67.80			0.8	10
Sodium	10490	5000	п		10670			2	10
Zinc	< 50.0	100	п		< 10.00				10

NOTE:

[%]R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level. RPD = Relative Percent Difference, %D = % Difference, DL = Detection Limit for QC sample

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Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	% D or RPD	%D or RPD Limit
CPMS-PE DRC-I									
Batch 1508070 - 20	0.2 - TR Metals	И	/ater					ICPN	/IS-PE DRC-I
Method Blank (1508)	070-BLK2)	Dilution Factor: 5				Prepai	red & Analyz	red: 08/11/15	
Vanadium	< 10.0	15.0	ug/L						
Chromium	< 5.00	10.0	я						
Cobalt	< 0.500	1.00	я						
Nickel	< 2.50	5.00	я						
Copper	< 2.50	5.00	51						
Arsenic	< 2.50	10.0	я						
Selenium	< 5.00	10.0	п						
Molybdenum	< 5.00	5.00	н						
Silver	< 2.50	5.00	н						
Cadmium	< 0.500	1.00	н						
Antimony	< 2.50	5.00	п						
Barium	< 25.0	50.0	н						
Thallium	< 2.50	5.00	н						
Lead	< 0.500	1.00	н						
Duplicate (1508070-I	DUP2)	Dilution Factor: 5 Source:		C150803-0)1	Prepai	red & Analyz	red: 08/11/15	
Vanadium		4E O	ug/L		< 10.0				
	< 10.0	15.0							20
	< 10.0 < 5.00	10.0	ug/L						20 20
Chromium					< 5.00				20 20 20
Chromium Cobalt	< 5.00	10.0	"		< 5.00 < 0.500				20
Chromium Cobalt Nickel	< 5.00 < 0.500	10.0 1.00	11		< 5.00 < 0.500 < 2.50			5	20 20
Chromium Cobalt Nickel Copper	< 5.00 < 0.500 < 2.50	10.0 1.00 5.00	n n		< 5.00 < 0.500 < 2.50 4.813			5	20 20 20
Chromium Cobalt Nickel Copper Arsenic	< 5.00 < 0.500 < 2.50 5.064	10.0 1.00 5.00 5.00	11 11 11		< 5.00 < 0.500 < 2.50 4.813 < 2.50			5	20 20 20 20 20 20
Chromium Cobalt Nickel Copper Arsenic Selenium	< 5.00 < 0.500 < 2.50 5.064 < 2.50	10.0 1.00 5.00 5.00 10.0	" " " " " " " " " " " " " " " " " " " "		< 5.00 < 0.500 < 2.50 4.813 < 2.50 < 5.00			5	20 20 20 20 20 20
Chromium Cobalt Nickel Copper Arsenic Selenium Molybdenum	< 5.00 < 0.500 < 2.50 5.064 < 2.50 < 5.00	10.0 1.00 5.00 5.00 10.0	n n n		< 5.00 < 0.500 < 2.50 4.813 < 2.50 < 5.00			5	20 20 20 20 20 20 20
Chromium Cobalt Nickel Copper Arsenic Selenium Molybdenum Silver	< 5.00 < 0.500 < 2.50 5.064 < 2.50 < 5.00	10.0 1.00 5.00 5.00 10.0 10.0 5.00			< 5.00 < 0.500 < 2.50 4.813 < 2.50 < 5.00 < 5.00 < 2.50			5	20 20 20 20 20 20 20 20
Chromium Cobalt Nickel Copper Arsenic Selenium Molybdenum Silver Cadmium	< 5.00 < 0.500 < 2.50 5.064 < 2.50 < 5.00 < 5.00 < 2.50	10.0 1.00 5.00 5.00 10.0 10.0 5.00			< 5.00 < 0.500 < 2.50 4.813 < 2.50 < 5.00 < 5.00 < 2.50 < 0.500			5	20 20 20 20 20 20 20
Chromium Cobalt Nickel Copper Arsenic Selenium Molybdenum Silver Cadmium Antimony	< 5.00 < 0.500 < 2.50 5.064 < 2.50 < 5.00 < 5.00 < 2.50 < 0.500 < 2.50	10.0 1.00 5.00 5.00 10.0 10.0 5.00 5.00	" " " " " " " " " " "		< 5.00 < 0.500 < 2.50 4.813 < 2.50 < 5.00 < 5.00 < 2.50 < 0.500 < 2.50				20 20 20 20 20 20 20 20 20
Chromium	< 5.00 < 0.500 < 2.50 5.064 < 2.50 < 5.00 < 5.00 < 2.50 < 0.500	10.0 1.00 5.00 5.00 10.0 10.0 5.00 5.00			< 5.00 < 0.500 < 2.50 4.813 < 2.50 < 5.00 < 5.00 < 2.50 < 0.500			5	20 20 20 20 20 20 20 20 20

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Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	% D or RPD	%D or RPD Limit
Batch 1508070 - 200	0.2 - TR Metals	ν	Vater					ICPN	IS-PE DRC-II
Matrix Spike (150807	70-MS2)	Dilution Factor: 5	Source	: C150803-0)1	Prepa	red & Analyz	ed: 08/11/15	
Vanadium	283.8	15.0	ug/L	300	< 10.0	95	70-130		
Chromium	378.8	10.0	51	400	< 5.00	95	70-130		
Cobalt	184.6	1.00	я	200	< 0.500	92	70-130		
Nickel	458.8	5.00	я	500	< 2.50	92	70-130		
Copper	337.0	5.00	я	300	4.813	111	70-130		
Arsenic	753.7	10.0	я	800	< 2.50	94	70-130		
Selenium	1884	10.0	н	2000	< 5.00	94	70-130		
Molybdenum	370.5	5.00	п	400	< 5.00	93	70-130		
Silver	68.95	5.00	п	75.0	< 2.50	92	70-130		
Cadmium	184.9	1.00	п	200	< 0.500	92	70-130		
Antimony	775.0	5.00	я	800	< 2.50	97	70-130		
Barium	223.0	50.0	я	200	42.77	90	70-130		
Thallium	1784	5.00	я	2000	< 2.50	89	70-130		
Lead	921.3	1.00	п	1000	5.929	92	70-130		
Reference (1508070-S	SRM2)	Dilution Factor: 2				Prepared & Analy		ed: 08/11/15	
Vanadium	929.7	60.0	ug/L	1000		93	85-115		
Chromium	945.6	40.0	п	1000		95	85-115		
Cobalt	933.9	4.00	н	1000		93	85-115		
Nickel	920.0	20.0	н	1000		92	85-115		
Copper	951.7	20.0	"	1000		95	85-115		
Arsenic	2042	40.0	"	2000		102	85-115		
Selenium	987.3	40.0	н	1000		99	85-115		
Molybdenum	899.4	20.0	я	1000		90	85-115		
Silver	239.2	20.0	я	250		96	85-115		
Cadmium	931.3	4.00	я	1000		93	85-115		
Antimony	1918	20.0	я	2000		96	85-115		
Barium	920.7	200	я	1000		92	85-115		
Thallium	4590	20.0	я	5000		92	85-115		
Lead	1880	4.00	я	2000		94	85-115		

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Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	% D or RPD	%D or RPD Limit
Batch 1508077 - 150	08070	V	Vater					ICP	MS-PE DRC-I
Serial Dilution (15080	77-SRD1)	Dilution Factor: 2	Source	: C150803-0)1	Prepa	red & Analyz	ed: 08/11/15	
Vanadium	< 50.0	75.0	ug/L		< 10.00				10
Chromium	< 25.0	50.0	"		< 5.00				10
Cobalt	< 2.50	5.00	**		< 0.50				10
Nickel	< 12.5	25.0	**		< 2.50				10
Copper	< 12.5	25.0	я		4.813				10
Arsenic	< 12.5	50.0	я		< 2.50				10
Selenium	< 25.0	50.0	н		< 5.00				10
Molybdenum	< 25.0	25.0	п		< 5.00				200
Silver	< 12.5	25.0	п		< 2.50				10
Cadmium	< 2.50	5.00	п		< 0.50				10
Antimony	< 12.5	25.0	**		< 2.50				10
Barium	< 125	250	**		42.77				10
Thallium	< 12.5	25.0	"		< 2.50				10
Lead	5.082	5.00	п		5.929			15	10
ICPOE - PE Optima	a								
Batch 1508070 - 200	0.2 - TR Metals	V	Vater					ICPO	E - PE Optima
Method Blank (15080)	70-BLK1)	Dilution Factor: 1				Prepa	red & Analyz	ed: 08/11/15	
Aluminum	< 20.0	50.0	ug/L						
Beryllium	< 2.00	5.00	"						
, Calcium	< 100	250	н						
ron	< 100	250	н						
Potassium	< 250	1000	**						
Magnesium	< 100	250	**						
Vlanganese	6.774	5.00	я						
Sodium	< 250	1000	н						
Zinc	< 10.0	20.0	н						

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Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%Dor RPD	%D or RPD Limit
Batch 1508070 - 20	00.2 - TR Metals	ν	Vater					ICPO	E - PE Optima
Duplicate (1508070-I	DUP1)	Dilution Factor: 1	Source	: C150803-0	11	Prepa	red & Analyz	ted: 08/11/15	
Aluminum	242.2	50.0	ug/L		232.1			4	20
Beryllium	< 2.00	5.00	я		< 2.00				20
Calcium	53060	250	я		53850			1	20
Iron	495.0	250	я		489.3			1	20
Potassium	1968	1000	я		1957			0.6	20
Magnesium	7704	250	н		7740			0.5	20
Manganese	91.32	5.00	н		90.63			0.8	20
Sodium	10910	1000	п		11070			1	20
Zinc	34.82	20.0	п		34.41			1	20
Matrix Spike (15080	70-MS1)	Dilution Factor: 1	Dilution Factor: 1 Source: C150803-01 Prepared & Analyzed: 08/11/15				ted: 08/11/15		
Aluminum	2303	50.0	ug/L	2000	232.1	104	70-130		
Beryllium	201.9	5.00	п	200	< 2.00	101	70-130		
Calcium	54750	250	п	1000	53850	91	70-130		
ron	3598	250	п	3000	489.3	104	70-130		
Potassium	12210	1000	п	10000	1957	103	70-130		
Magnesium	9919	250	п	2000	7740	109	70-130		
Manganese	296.9	5.00	#	200	90.63	103	70-130		
Sodium	14130	1000	я	3000	11070	102	70-130		
Zinc	238.1	20.0	я	200	34.41	102	70-130		
Reference (1508070-	SRM1)	Dilution Factor: 1				Prepa	red & Analyz	red: 08/11/15	
Aluminum	998.2	50.0	ug/L	1000		100	85-115		
Beryllium	979.5	5.00	п	1000		98	85-115		
- Calcium	976.7	250	п	1000		98	85-115		
Iron	986.5	250	я	1000		99	85-115		
Potassium	4933	1000	я	5000		99	85-115		
Magnesium	975.6	250	я	1000		98	85-115		
Manganese	1005	5.00	п	1000		101	85-115		
Sodium	992.2	1000	н	1000		99	85-115		
Zinc	998.1	20.0	я	1000		100	85-115		

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Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%D or RPD	%D or RPD Limit	
Batch 1508078 - 15	608070	V	Vater					ICPO	E - PE Optima	
Serial Dilution (1508	078-SRD1)	Dilution Factor: 5	5 Source: C150803-01				Prepared & Analyzed: 08/11/15			
Aluminum	236.4	250	ug/L		232.1			2	10	
Beryllium	< 10.0	25.0	#		< 2.00				10	
Calcium	52870	1250	я		53850			2	10	
Iron	619.8	1250	я		489.3			24	10	
Potassium	1933	5000	я		1957			1	10	
Magnesium	7701	1250	п		7740			0.5	10	
Manganese	91.33	25.0	п		90.63			0.8	10	
Sodium	11060	5000	п		11070			0.1	10	
Zinc	53.43	100	п		34.41			43	10	

NOTE:

RPD = Relative Percent Difference, %D = % Difference, DL = Detection Limit for QC sample

[%]R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level.

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Mercury only (Total) by EPA 245.1 / 7470A Method - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%Dor RPD	%D or RPD Limit	
CVAA FIMS - PI	E									
Batch 1508071 - E	EPA 245.1/245.2 Prep	V	Vater			CVAA FIMS - P				
Method Blank (150	08071-BLK1)	Dilution Factor: 1				Prepa	red & Analyz	zed: 08/11/15		
Mercury	< 0.0500	0.100	ug/L							
Method Blank Spil	ke (1508071-BS1)	Dilution Factor: 1				Prepa	red & Analyz	zed: 08/11/15		
Mercury	8.14	0.100	ug/L	7.50		109	85-115			
Duplicate (1508071	I-DUP1)	Dilution Factor: 1	Source: C150803-01			Prepa				
Mercury	< 0.0500	0.100	ug/L		< 0.0500				20	
Matrix Spike (1508	3071-MS1)	Dilution Factor: 1	Source	e: C150803-0)1	Prepa	red & Analyz	zed: 08/11/15		
Mercury	8.07	0.100	ug/L	7.50	< 0.0500	108	75-125			
Batch 1508072 - 1508071		ν	Vater					C,	VAA FIMS - PE	
Instrument Blank	(1508072-IBL1)	Dilution Factor: 1				Prepa	red & Analyz	zed: 08/11/15		
Mercury	< 0.0500	0.100	ug/L							

NOTE:

%R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level. RPD = Relative Percent Difference %D = % Difference, DL = Detection Limit for QC sample

TDF #: A-098

Classical Chemistry by EPA/ASTM/APHA Methods - Quality Control TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%Dor RPD	%D or RPD Limit
Mettler AT									
Batch 1508066 - No Prep	Req	V	Vater						Mettler A7
Method Blank (1508066-B	LK1)	Dilution Factor: 1				Prepai	red & Analyz	zed: 08/11/15	
Total Alkalinity	< 5.00	10.0	mg CaCO3 /						
Duplicate (1508066-DUP1)	Dilution Factor: 1	Source:	C150803-0	3	Prepai	red & Analyz	zed: 08/11/15	
Total Alkalinity	81.9	10.0	mg CaCO3 /		82.4			0.5	20
Reference (1508066-SRM1	1)	Dilution Factor: 1				Prepai	red & Analyz	zed: 08/11/15	
Total Alkalinity	77.2	10.0	mg CaCO3 / L	78.1		99	88.7-111.3		
None - Gravimetric	_								
Batch 1508064 - No Prep	Req		Vater						- Gravimetrio
Method Blank (1508064-B	LK1)	Dilution Factor: 1				Prepai	red: 08/11/15	Analyzed: 08/1	2/15
Total Dissolved Solids	18	10	mg/L						
Duplicate (1508064-DUP1)	Dilution Factor: 1	Source:	C150803-1	5	Prepai	red: 08/11/15	Analyzed: 08/1	2/15
Total Dissolved Solids	254	10	mg/L		254			0	20
Reference (1508064-SRM1	1)	Dilution Factor: 1				Prepai	red: 08/11/15	Analyzed: 08/1	2/15
Total Dissolved Solids	4390	10	mg/L	4500		98	75-125		
Batch 1508065 - No Prep Req			Vater					None	- Gravimetrio
Method Blank (1508065-B	LK1)	Dilution Factor: 1				Prepai	red: 08/11/15	Analyzed: 08/1	2/15
Total Suspended Solids	< 10	10	mg/L						
Duplicate (1508065-DUP1)	Dilution Factor: 1	Source:	C150803-1	5	Prepai	red: 08/11/15	Analyzed: 08/1	2/15
Total Suspended Solids	< 10	10	mg/L		< 10				20

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

TDF #: A-098

Classical Chemistry by EPA/ASTM/APHA Methods - Quality Control

Certificate of Analysis

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%Dor RPD	% D or RPD Limit
Batch 1508065 - No Pre	p Req		Water					None	e - Gravimetric
Reference (1508065-SRM	1)	Dilution Factor:	1			Prepa	red: 08/11/15	Analyzed: 08	/12/15
Total Suspended Solids	136	10	mg/L	150		91	75-125		

NOTE: %R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level.

RPD = Relative Percent Difference, %D = % Difference, DL = Detection Limit for QC sample

TDF#: A-098

TechLaw Inc., ESAT Region 8 INORGANIC ANALYSES DATA SHEET Intial and Continuing Calibration Blanks

Analytical Method: 200.7 Analysis Name: ICPOE Diss. Metals

Instrument: ICPOE - PE Optima Work Order. Nu C150803

Analytical Sequence: 1508068 **Dissolved** Concentration Units: ug/L

Analyte	Initial Calibration Blank (1 & 2)	c	Continuing Calibration Blanks Method Blank (Batch ID)			Blank		
		1	2	3	4	1508062-BLK1	NA	
	3.10	2.48						
Aluminum		5	6	7	8	4.98	NA	50.00
						4500000 PL 1/4		
	0.18	1	2	3	4	1508062-BLK1	NA	+
Beryllium		0.08 5	6	7	8	0.02	NA	5.00
		5	<u> </u>	/	8	†		
		1	2	3	4	1508062-BLK1	NA	
	-0.03	4.51]
Calcium		5	6	7	8	4.30	NA	250.00
		1	2	3		1508062-BLK1	NA	
	4.65			3	4	1300002-BEK1	INA	+
Iron		26.07 5	6	7	8	49.09	NA	250.00
		Ů	•	,	<u> </u>	1		
		1	2	3	4	1508062-BLK1	NA	
5	20.43	45.20				45.70	NA	1,000.00
Potassium		5	6	7	8	15.79	INA	1,000.00
		1	2	3	4	1508062-BLK1	NA	
	-0.01	1.24		,	4	iooooo Daxxi		†
Magnesium		5	6	7	8	4.62	NA	250.00
	0.06	1	2	3	4	1508062-BLK1	NA	↓
Manganese	0.06	0.09				-0.29	NA	5.00
Waligaliese	 	5	6	7	8	-0.25	1471	0.00
	+	1	2	3	4	1508062-BLK1	NA	
	-0.81	-0.40			7			†
Sodium		5	6	7	8	8.89	NA	1,000.00

TDF#: A-098

TechLaw Inc., ESAT Region 8
INORGANIC ANALYSES DATA SHEET
Intial and Continuing Calibration Blanks

Analytical Method: 200.7 Analysis Name: ICPOE Diss. Metals

Instrument: ICPOE - PE Optima Work Order. Nu C150803

Analytical Sequence: 1508068 **Dissolved** Concentration Units: <u>ug/L</u>

Analyte	Initial Calibration Blank (1 & 2)	C	Continuing Cal	ibration Blank	ĸs	Metho Blan (Batch	k	PQL
		1	2	3	4	1508062-BLK1	NA	
	1.21	1.32						
Zinc		5	6	7	8	-0.74	NA	20.00

TDF#: A-098

TechLaw Inc., ESAT Region 8 INORGANIC ANALYSES DATA SHEET Intial and Continuing Calibration Blanks

Analytical Method: 200.8 Analysis Name: ICPMS Diss. Metals

Instrument: ICPMS-PE DRC-II Work Order. Nu C150803

Analytical Sequence: 1508069 **Dissolved** Concentration Units: <u>ug/L</u>

Analyte	Initial Calibration Blank (1 & 2)	C	Continuing Cal	ibration Blank	s	Method Blank (Batch ID		PQL
		1	2	3	4	1508063-BLK1	NA	
	-0.02	0.06						T
Vanadium		5	6	7	8	-0.11	NA	3.00
			_	_				
	-0.05	1	2	3	4	1508063-BLK1	NA	+
Chromium		-0.03		_		-0.05	NA	2.00
		5	6	7	8	1		
		1	2	3	4	1508063-BLK1	NA	
	0.02	0.01			•			7
Cobalt		5	6	7	8	-0.03	NA	0.20
	-0.01	1	2	3	4	1508063-BLK1	NA	↓
Nickel	-0.01	0.00				-0.06	NΙΛ	1.00
Mickel		5	6	7	8	-0.00	NA	1.00
	+	1	2	3		1508063-BLK1	NA	
	0.02			3	4	1300003-BERT	INA	†
Copper		0.07 5	6	7	8	-0.06	NA	1.00
		Ŭ		,	·	1		
		1	2	3	4	1508063-BLK1	NA	
	-0.15	0.00						T
Arsenic		5	6	7	8	-0.01	NA	2.00
	0.03	1	2	3	4	1508063-BLK1	NA	4
Selenium	0.00	-0.12				0.18	NA	2.00
Contain		5	6	7	8	-		
		1	2	3	4	1508063-BLK1	NA	1
	0.04	0.03			7			†
Molybdenum		5	6	7	8	-0.01	NA	1.00
						7		

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TechLaw Inc., ESAT Region 8 INORGANIC ANALYSES DATA SHEET Intial and Continuing Calibration Blanks

Analytical Method: 200.8 Analysis Name: ICPMS Diss. Metals

Instrument: ICPMS-PE DRC-II Work Order: Nu C150803

Analytical Sequence: 1508069 **Dissolved** Concentration Units: <u>ug/L</u>

Analyte	Initial Calibration Blank (1 & 2)	C	Continuing Cal	ibration Blank	s	Metho Blank (Batch I		PQL
		1	2	3	4	1508063-BLK1	NA	
	0.03	0.03						
Silver		5	6	7	8	-0.02	NA	1.00
	0.01	1	2	3	4	1508063-BLK1	NA	_
Conductives	0.01	0.02				0.03	NA	0.20
Cadmium		5	6	7	8	-0.03	INA	0.20
	0.13	1	2	3	4	1508063-BLK1	NA	<u> </u>
Antimony	0.10	0.21				-0.04	NA	1.00
Anumony		5	6	7	8	-0.04	IVA	1.00
						4500000 PL 1/4	3.1. 0	
	0.02	1	2	3	4	1508063-BLK1	NA	+
Barium		0.01				-0.04	NA	10.00
24.14.11		5	6	7	8			
		1	2	3		1508063-BLK1	NA	
	0.01				4	1300003-BERT	INA	†
Thallium		-0.01		7	•	-0.10	NA	1.00
		5	6	<i>'</i>	8	†		
		1	2	3	4	1508063-BLK1	NA	
	0.01				4	1300000 007(1)		†
Lead		0.00 5	6	7	8	-0.05	NA	0.20
					O	†		

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TechLaw Inc., ESAT Region 8
INORGANIC ANALYSES DATA SHEET
Intial and Continuing Calibration Blanks

Analytical Method: 245.1 Analysis Name: TM Mercury 245.1

Instrument: CVAA FIMS - PE Work Order. Nu C150803

Analytical Sequence: 1508072 **Total** Concentration Units: <u>ug/L</u>

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Mercury	0.00	1	2	3	4	1508071-BLK1	NA	0.10
		0.01				0.00	NA	
		5	6	7	8			

Certificate of Analysis

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TechLaw Inc., ESAT Region 8
INORGANIC ANALYSES DATA SHEET
Intial and Continuing Calibration Blanks

Analytical Method: <u>EPA 310.1</u> Analysis Name: <u>WC - Alkalinity</u>

Instrument: Mettler AT Work Order. Nu C150803

Analytical Sequence: Total Concentration Units: mg CaCO3 / L

Analyte	Initial Calibration Blank (1 & 2)	(Continuing Cal	ibration Blank	(S	Metho Blan (Batch	k	PQL
		1	2	3	4	1508066-BLK1	NA	
		1.25						40.00
Total Alkalinity		5	6	7	8	0.87	NA	10.00

TechLaw Inc., ESAT Region 8 INORGANIC ANALYSES DATA SHEET Intial and Continuing Calibration Blanks

Analytical Method: 200.8 Analysis Name: ICPMS Tot. Rec. Metals

Instrument: ICPMS-PE DRC-II Work Order. Nu C150803

Analytical Sequence: 1508077 **Total Recoverable** Concentration Units: <u>ug/L</u>

Analyte	Initial Calibration Blank (1 & 2)	(Continuing Cali	bration Blank	s	ВІ	ethod ank ch ID)	PQL
		1	2	3	4	NA	1508070-BLK2	
	-0.02	0.06	-0.01					
Vanadium		5	6	7	8	NA	0.01	3.00
	-0.05	1	2	3	4	NA	1508070-BLK2	
Clamanai vuo	-0.05	-0.03	-0.06			NA	0.27	2.00
Chromium		5	6	7	8	INA	0.27	2.00
		1	2	3		NA	1508070-BLK2	
	0.02			3	4	INA	1506070-BLK2	
Cobalt		0.01 5	0.00	7		NA	-0.03	0.20
	1	5	6	1	8	1		
		1	2	3	4	NA	1508070-BLK2	
	-0.01	0.00	0.00					
Nickel		5	6	7	8	NA	-0.06	1.00
		1	2	3	4	NA	1508070-BLK2	
	0.02	0.07	0.02				0.00	4.00
Copper		5	6	7	8	NA	-0.03	1.00
	-0.15	1	2	3	4	NA	1508070-BLK2	
Arsenic	-0.10	0.00	-0.11			NA	-0.08	2.00
Alsenic	-	5	6	7	8	14/-1	0.00	2.00
		1	2	3	4	NA	1508070-BLK2	
	0.03	-0.12	0.18	-	4			
Selenium		-0.12 5	6	7	8	NA	-0.04	2.00
		*		·		i.		
		1	2	3	4	NA	1508070-BLK2	
	0.04	0.03	0.02				0.04	4.05
Molybdenum		5	6	7	8	NA	-0.04	1.00

TechLaw Inc., ESAT Region 8 INORGANIC ANALYSES DATA SHEET Intial and Continuing Calibration Blanks

Analytical Method: 200.8 Analysis Name: ICPMS Tot. Rec. Metals

Instrument: ICPMS-PE DRC-II Work Order. Nu C150803

Analytical Sequence: 1508077 **Total Recoverable** Concentration Units: <u>ug/L</u>

Analyte	Initial Calibration Blank (1 & 2)	(Continuing Cal	ibration Blanl	ks	ВІ	thod ank ch ID)	PQL
		1	2	3	4	NA	1508070-BLK2	
	0.03	0.03	0.02					
Silver		5	6	7	8	NA	-0.03	1.00
		1	2	3	4	NA	1508070-BLK2	
	0.01	0.02	0.01		7			
Cadmium		5	6	7	8	NA	-0.04	0.20
		1	2	3	4	NA	1508070-BLK2	
	0.13	0.21	0.21		4			
Antimony		5	6	7	8	NA	-0.03	1.00
		1	2	3	4	NA	1508070-BLK2	
	0.02	0.01	0.00		4			
Barium		5	6	7	8	NA	-0.05	10.00
		1	2	3		NA	1508070-BLK2	
	0.01	-0.01	0.13	•	4	14/1	1300070-BERZ	
Thallium		5	6	7	8	NA	-0.11	1.00
		1	2	3		NA	1508070-BLK2	
	0.01			3	4	IVA	1900/U-BLK2	
Lead		0.00 5	0.00 6	7	8	NA	-0.04	0.20
		3	•	,	•			

TechLaw Inc., ESAT Region 8 INORGANIC ANALYSES DATA SHEET Intial and Continuing Calibration Blanks

Analytical Method: 200.7 Analysis Name: ICPOE Tot. Rec. Metals

Instrument: ICPOE - PE Optima Work Order: Nu C150803

Analytical Sequence: 1508078 **Total Recoverable** Concentration Units: <u>ug/L</u>

Analyte	Initial Calibration Blank (1 & 2)		Continuing Cali	bration Blank	ks	Method Blank (Batch II		PQL
		1	2	3	4	1508070-BLK1	NA	
	3.10	2.48	3.18					
Aluminum		5	6	7	8	1.47	NA	50.00
			_					
	0.18	1	2	3	4	1508070-BLK1	NA	4
Beryllium		0.08	0.10		_	0.02	NA	5.00
		5	6	7	8	-		
		1	2	3	4	1508070-BLK1	NA	
	-0.03	4.51	3.74					1
Calcium		5	6	7	8	-2.20	NA	250.00
	4.65	1	2	3	4	1508070-BLK1	NA	↓
Iron	4.00	26.07	24.54			-11.66	NA	250.00
IIOI		5	6	7	8	-11.00	1471	200.00
		1	2	3	4	1508070-BLK1	NA	
	20.43	45.20	52.95					7
Potassium		5	6	7	8	27.12	NA	1,000.00
	-0.01	1	2	3	4	1508070-BLK1	NA	4
Magnesium	-0.01	1.24	2.09			-5.66	NA	250.00
Magnesiam		5	6	7	8	-5.55		255.55
		1	2	3	4	1508070-BLK1	NA	
	0.06	0.09	0.07					7
Manganese		5	6	7	8	6.77	NA	5.00
	+	1	2	3	4	1508070-BLK1	NA	+
	-0.81	-0.40	-4.64		4	.300010 BEACT	(1/)	†
Sodium		-0.40 5	-4.64 6	7	8	15.02	NA	1,000.00
		-		•		1		

Certificate of Analysis

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TechLaw Inc., ESAT Region 8
INORGANIC ANALYSES DATA SHEET
Intial and Continuing Calibration Blanks

Analytical Method: 200.7 Analysis Name: ICPOE Tot. Rec. Metals

Instrument: ICPOE - PE Optima Work Order: Nu C150803

Analytical Sequence: 1508078 **Total Recoverable** Concentration Units: <u>ug/L</u>

Analyte	Initial Calibration Blank (1 & 2)	C	Continuing Cal	libration Blank	ĸs	Metho Blan (Batch	k	PQL
		1	2	3	4	1508070-BLK1	NA	
	1.21	1.32	1.04					
Zinc		5	6	7	8	2.24	NA	20.00

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPOE - PE Optima Method: 200.7 Analysis Name: ICPOE Diss. Metals

Sequence: 1508068 Work Order: C150803 Units: ug/L

Dissolved	Initi	al (ICV1,	ICV2)		Conti	inuing Ca	alibration	Verification	on Stand	ards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
	12500	12560	100.5	12500	12430	99.4						
Aluminum	12000	12000	100.0		4			5			6	
					7			8			9	
					1			2			3	
	500	506.0	101.2	500	503.0	100.6						
Beryllium					4			5			6	
					-							
					7			8			9	
	+				1			2			3	
				12500	12570	100.6						
Calcium	12500	12610	100.9		4			5			6	
Carciairi												
					7			8			9	
					1			2			3	
	12500	12740	101.9	12500	12670	101.4						
Iron	12000				4			5			6	
					7			8			9	
	+				1			2			3	
				12500	12570	100.6						
Magnesium	12500	12650	101.2		4			5			6	
Magnesiam												
					7			8			9	
				4600	1	100 -		2			3	
	1000	1022	102.2	1000	1025	102.5						
Manganese					4			5			6	
					7			8			9	

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPOE - PE Optima Method: 200.7 Analysis Name: ICPOE Diss. Metals

Sequence: 1508068 Work Order. C150803 Units: ug/L

Dissolved	Initi	al (ICV1, I	ICV2)					Verification	n Stand	lards (CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
		05050	400.0	25000	24810	99.2						
Potassium	25000	25050	100.2		4			5			6	
1 Otassiai I												
					7			8			9	
					1			2			3	
	10500	10500	100.0	12500	12460	99.7						
Sodium	12500	12530	100.2		4			5			6	
Coarain												
					7			8			9	
					1			2			3	
	0500	0550	100.4	2500	2581	103.2						
Zinc	2500	2559	102.4		4			5			6	
_												
					7			8			9	

Metals - ICV & CCV % R Criteria = 90 - 110%, Classical Chemistry % R Criteria - ICV = 90 - 110% R, CCV = 80 - 120% R.

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II Method: 200.8 Analysis Name: ICPMS Diss. Metals

Sequence: 1508069 Work Order. C150803 Units: ug/L

Dissolved	Init	ial (ICV1, I	ICV2)		Cont	inuing Ca	alibration	Verification	on Stand	ards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
	50.0	49.3	98.6	50.0	49.3	98.6						
Antimony	30.0	49.3	90.0		4			5			6	
					7			8			9	
											-	
					1			2			3	
	50.0	49.6	99.2	50.0	50.9	101.8						
Arsenic					4			5			6	
					7						9	
								8				
					1			2			3	
				50.0	50.8	101.6						
Barium	50.0	50.1	100.2		4			5			6	
Daram												
					7			8			9	
					1			2			3	
	50.0	48.7	97.4	50.0	49.5	99.0						
Cadmium	30.0	40.7	51.4		4			5			6	
					7			8			9	
	+				1			2			3	
				50.0	51.3	102.6						
Chromium	50.0	50.9	101.8		4			5			6	
Chichian												
					7			8			9	
					1			2			3	
	50.0	49.0	98.0	50.0	52.0	104.0						
Cobalt					4			5			6	
					7			8			9	
					•							

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II Method: 200.8 Analysis Name: ICPMS Diss. Metals

Sequence: 1508069 Work Order. C150803 Units: ug/L

Dissolved	Init	ial (ICV1, I	ICV2)		Cont	inuing Ca	alibration	Nerification	on Stand	lards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
	50.0	51.0	102.0	50.0	51.4	102.8						
Copper	30.0	31.0	102.0		4			5			6	
					7			8			9	
					1			2			3	
	50.0	49.8	99.6	50.0	49.8	99.6						
Lead	00.0	40.0			4			5			6	
					7			8			9	
					1			2			3	
	50.0	49.0	98.0	50.0	49.6	99.2						
Molybdenum					4			5			6	
					7			8			9	
					11			2			3	
	50.0	50.2	100.4	50.0	51.4	102.8						
Nickel			100.1		4			5			6	
					7			8			9	
					1			2			3	
	50.0	48.0	96.0	50.0	49.9	99.8						
Selenium					4			5			6	
					7			8			9	
					1 10.0			2			3	
	50.0	49.8	99.6	50.0	49.9	99.8		-				
Silver					4			5			6	
					7			8			9	
					<u> </u>			0			J	

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II Method: 200.8 Analysis Name: ICPMS Diss. Metals

Sequence: 1508069 Work Order. C150803 Units: ug/L

Dissolved	Init	ial (ICV1, I	CV2)		Cont	inuing C	alibration	Verification	n Stand	lards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
	50.0	40.4	00.0	50.0	50.0	100.0						
Thallium	50.0	49.1	98.2		4			5			6	
					7			8			9	
					1			2			3	
	50.0	40.7	00.4	50.0	50.6	101.2						
Vanadium	50.0	49.7	99.4		4			5			6	
Variation												
					7			8			9	

Metals - ICV & CCV % R Criteria = 90 - 110%, Classical Chemistry % R Criteria - ICV = 90 - 110% R, CCV = 80 - 120% R.

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

CVAA FIMS - PE Method: 245.1 Analysis Name: TM_Mercury 245.1

Sequence: 1508072 Work Order. C150803 Units: ug/L

Total	Initi	al (ICV1, I	ICV2)		Cont	inuing Ca	alibration	Verification	n Stand	lards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
	F 00	F 00	405.0	5.00	5.08	101.6						
Mercury	5.00	5.26	105.2		4			5			6	
Wordary												
					7			8			9	

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria - ICV = 90 - 110%R, CCV = 80 - 120%R.

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

pH Meter Method: 150.1 Analysis Name: WC-pH

Sequence: 1508073 Work Order. C150803 Units: pH Units

WET	Initi	ial (ICV1, I	CV2)		Conti	nuing C	alibration	Verification	on Stanc	lards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
рН					4			5			6	
ρ												
					7			8			9	

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria - ICV = 90 - 110%R, CCV = 80 - 120%R.

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

Mettler AT Method: EPA 310.1 Analysis Name: WC - Alkalinity

Sequence: 1508074 Work Order. C150803 Units: mg CaCO3 / L

Total	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)										
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R		
					1			2			3			
				100	98.8	98.8								
Total Alkalinity					4			5			6			
rotar / maining														
					7			8			9			

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria - ICV = 90 - 110%R, CCV = 80 - 120%R.

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II Method: 200.8 Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508077 Work Order. C150803 Units: ug/L

Total Recoverable	Initi	ial (ICV1, I	ICV2)		Cont	inuing Ca	alibration	Verification	on Stand	ards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
	500	40.06	00.5	50.0	49.30	98.6	50.0	46.19	92.4			
Antimony	50.0	49.26	98.5		4			5			6	
					7			8			9	
					1			2			3	
	50.0	49.60	99.2	50.0	50.88	101.8	50.0	49.12	98.2			
Arsenic		10.00			4			5			6	
					7			8			9	
					1			2			3	
				50.0	50.77	101.5	50.0	48.94	97.9			
Darium	50.0	50.12	100.2		4			5			6	
Barium												
					7			8			9	
					11			2			3	
	50.0	48.71	97.4	50.0	49.49	99.0	50.0	47.01	94.0			
Cadmium			51.4		4			5			6	
					7			8			9	
					· ·						-	
					1			2			3	
	50.0	50.88	101.0	50.0	51.31	102.6	50.0	47.71	95.4			
Chromium	50.0	50.00	101.8		4			5			6	
					7			8			9	
				50.0	<u>1</u> 51.98	104.0	50.0	2 47.42	94.8		3	
O-b-14	50.0	49.03	98.1	00.0	4	104.0	55.0	5	0 7.0		6	
Cobalt												
					7			8			9	

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II Method: 200.8 Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508077 Work Order. C150803 Units: ug/L

Total Recoverable	Initi	ial (ICV1,	ICV2)		Cont	inuing C	alibration	Verification	on Stand	lards (CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
	50.0	51.00	102.0	50.0	51.38	102.8	50.0	47.09	94.2			
Copper	30.0	51.00	102.0		4			5			6	
					7			8			9	
					1			2			3	
		10.70		50.0	49.84	99.7	50.0	47.34	94.7			
Lead	50.0	49.76	99.5		4			5			6	
					7			8			9	
					1			2			3	
				50.0	49.61	99.2	50.0	46.98	94.0		<u></u>	
** :	50.0	49.00	98.0		4		5575	5	0 1.10		6	
Molybdenum												
					7			8			9	
					1			2			3	
	50.0	50.16	100.3	50.0	51.39	102.8	50.0	47.33	94.7			
Nickel					4			5			6	
					7			8			9	
											_	
					1			2			3	
	50.0	48.04	96.1	50.0	49.95	99.9	50.0	48.11	96.2			
Selenium	30.0	40.04	90.1		4			5			6	
					7			8			9	
					1			2			3	
				50.0	49.88	99.8	50.0	46.27	92.5			
Silver	50.0	49.82	99.6		4			5			6	
Onvoi								_				
					7			8			9	

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II Method: 200.8 Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508077 Work Order. C150803 Units: ug/L

Total Recoverable	Init	ial (ICV1, I	CV2)		Cont	inuing C	alibration	Verification	on Stand	lards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
	50.0	40.00	00.0	50.0	49.95	99.9	50.0	48.08	96.2			
Thallium	50.0	49.09	98.2		4			5			6	
The morn												
					7			8			9	
					1			2			3	
	50.0	40.70	00.4	50.0	50.56	101.1	50.0	47.91	95.8			
Vanadium	50.0	49.70	99.4		4			5			6	
7 31 23 31 11												
					7			8			9	

Metals - ICV & CCV % R Criteria = 90 - 110%, Classical Chemistry % R Criteria - ICV = 90 - 110% R, CCV = 80 - 120% R.

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPOE - PE Optima Method: 200.7 Analysis Name: ICPOE Tot. Rec. Metals

Sequence: 1508078 Work Order: C150803 Units: ug/L

Sequence. 1500076		VVOIR O	idei. Cit			Jilia. ug	J/ L					
Total Recoverable	Initi	ial (ICV1, l	ICV2)		Cont	inuing C	alibration	Verification	on Stand	ards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
	10500	10500	100.5	12500	12430	99.4	12500	11960	95.7			
Aluminum	12500	12560	100.5		4			5			6	
Admidit												
					7			8			9	
					1			2			3	
	500	506.0	101.2	500	503.0	100.6	500	492.1	98.4			
Beryllium	500	506.0	101.2		4			5			6	
,												
					7			8			9	
					1			2			3	
	12500	12610	100.9	12500	12570	100.6	12500	11950	95.6			
Calcium	12000	12010	100.5		4			5			6	
					7			8			9	
					1			2			3	
	12500	12740	101.9	12500	12670	101.4	12500	11980	95.8			
Iron	12000	.2. 10	.01.0		4			5			6	
					7			8			9	
					-							
				12500	<u>1</u> 12570	100.6	12500	2 12010	96.1		3	
	12500	12650	101.2	12500		100.6	12500		90.1			
Magnesium					4			5			6	
					7			8			9	
											<u> </u>	
					1			2			3	
				1000	1025	102.5	1000	994.0	99.4		აა	
	1000	1022	102.2	1500	4	102.0	1300	5	JJ.7		6	
Manganese					- -							
					7			8			9	
					•							

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPOE - PE Optima Method: 200.7 Analysis Name: ICPOE Tot. Rec. Metals

Sequence: 1508078 Work Order. C150803 Units: ug/L

Total Recoverable	Initi	al (ICV1, I	ICV2)		Cont	inuing Ca	alibration	Verification	on Stand	ards(CC	Vs)	
Analyte	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
					1			2			3	
				25000	24810	99.2	25000	23930	95.7			
Potæsium	25000	25050	100.2		4			5			6	
, otacordini												
					7			8			9	
					1			2			3	
	40500	40500	100.0	12500	12460	99.7	12500	12040	96.3			
Sodium	12500	12530	100.2		4			5			6	
					7			8			9	
					1			2			3	
	2500	2559	102.4	2500	2581	103.2	2500	2462	98.5			
Zinc	2300	2009	102.4		4			5			6	
					7			8			9	

Metals - ICV & CCV % R Criteria = 90 - 110%, Classical Chemistry % R Criteria - ICV = 90 - 110% R, CCV = 80 - 120% R.

A-098

TechLaw, Inc. - ESAT Region 8 ICP Interference Check Sample ICPMS-PE DRC-II

Analyte Sequence: 15	608069	<u>C</u> Analysis:	heck Sample ICPMS Diss. Metals	Result*	<u>Units</u>	True	<u>%R</u>	<u>PQL</u>
Antimony			IFA1	0.0	ug/L			1.00
			IFB1	0.0	ug/L			1.00
Arsenic			IFA1	0.0	ug/L			2.00
			IFB1	20.8	ug/L	20	104	2.00
Barium			IFA1	0.0	ug/L			10.0
			IFB1	0.1	ug/L			10.0
Cadmium			IFA1	0.0	ug/L			0.200
			IFB1	19.7	ug/L	20	99	0.200
Chromium			IFA1	0.1	ug/L			2.00
			IFB1	21.1	ug/L	20	105	2.00
Cobalt			IFA1	0.2	ug/L			0.200
			IFB1	20.6	ug/L	20	103	0.200
Copper			IFA1	0.7	ug/L			1.00
			IFB1	22.2	ug/L	20	111	1.00
Lead			IFA1	0.0	ug/L			0.200
			IFB1	0.0	ug/L			0.200
Molybdenum			IFA1	199.9	ug/L	200	100	1.00
			IFB1	197.7	ug/L	200	99	1.00
Nickel			IFA1	-0.2	ug/L			1.00
			IFB1	20.5	ug/L	20	103	1.00
Selenium			IFA1	-0.4	ug/L			2.00
			IFB1	-0.4	ug/L			2.00
Silver			IFA1	0.0	ug/L			1.00
			IFB1	19.6	ug/L	20	98	1.00
Thallium			IFA1	-0.1	ug/L			1.00
			IFB1	-0.1	ug/L			1.00
Vanadium			IFA1	-0.2	ug/L			3.00
			IFB1	-0.3	ug/L			3.00

^{*}Criteria = 80-120%R of True Value or+/- PQL See raw data for complete analyte list and results.

A-098

TechLaw, Inc. - ESAT Region 8 ICP Interference Check Sample ICPMS-PE DRC-II

Analyte Sequence: 150807	Check Sample 7 Analysis: ICPMS Tot. Rec.	<u>Result*</u> Metals	<u>Units</u>	<u>True</u>	<u>%R</u>	<u>PQL</u>
Antimony	IFA1	0.0	ug/L			1.00
	IFB1	0.0	ug/L			1.00
Arsenic	IFA1	0.0	ug/L			2.00
	IFB1	20.8	ug/L	20	104	2.00
Barium	IFA1	0.0	ug/L			10.0
	IFB1	0.1	ug/L			10.0
Cadmium	IFA1	0.0	ug/L			0.200
	IFB1	19.7	ug/L	20	99	0.200
Chromium	IFA1	0.1	ug/L			2.00
	IFB1	21.1	ug/L	20	105	2.00
Cobalt	IFA1	0.2	ug/L			0.200
	IFB1	20.6	ug/L	20	103	0.200
Copper	IFA1	0.7	ug/L			1.00
	IFB1	22.2	ug/L	20	111	1.00
Lead	IFA1	0.0	ug/L			0.200
	IFB1	0.0	ug/L			0.200
Molybdenum	IFA1	199.9	ug/L	200	100	1.00
	IFB1	197.7	ug/L	200	99	1.00
Nickel	IFA1	-0.2	ug/L			1.00
	IFB1	20.5	ug/L	20	103	1.00
Selenium	IFA1	-0.4	ug/L			2.00
	IFB1	-0.4	ug/L			2.00
Silver	IFA1	0.0	ug/L			1.00
	IFB1	19.6	ug/L	20	98	1.00
Thallium	IFA1	-0.1	ug/L			1.00
	IFB1	-0.1	ug/L			1.00
Vanadium	IFA1	-0.2	ug/L			3.00
	IFB1	-0.3	ug/L			3.00

^{*}Criteria = 80-120%R of True Value or+/- PQL

See raw data for complete analyte list and results.

A-098

TechLaw, Inc. - ESAT Region 8 ICP Interference Check Sample ICPOE - PE Optima

Analyte Sequence: 1508068	Check Sample Analysis: ICPOE Diss. Metals	Result*	<u>Units</u>	True	<u>%R</u>	<u>PQL</u>
Aluminum	IFA1	59,401.9	ug/L	60,000	99	50.0
	IFB1	59,982.4	ug/L	60,000	100	50.0
Beryllium	IFA1	-0.4	ug/L			5.00
	IFB1	99.6	ug/L	100	100	5.00
Calcium	IFA1	286,521.7	ug/L	300,000	96	250
	IFB1	287,344.0	ug/L	300,000	96	250
Iron	IFA1	236,042.4	ug/L	250,000	94	250
	IFB1	236,025.1	ug/L	250,000	94	250
Magnesium	IFA1	140,652.9	ug/L	150,000	94	250
	IFB1	142,177.2	ug/L	150,000	95	250
Manganese	IFA1	0.9	ug/L			5.00
	IFB1	196.6	ug/L	200	98	5.00
Potassium	IFA1	-341.8	ug/L			1000
	IFB1	20,611.2	ug/L	20,000	103	1000
Sodium	IFA1	50,577.6	ug/L	50,000	101	1000
	IFB1	50,806.4	ug/L	50,000	102	1000
Zinc	IFA1	0.1	ug/L			20.0
	IFB1	290.4	ug/L	300	97	20.0

^{*}Criteria = 80-120%R of True Value or+/- PQL

See raw data for complete analyte list and results.

A-098

TechLaw, Inc. - ESAT Region 8 ICP Interference Check Sample ICPOE - PE Optima

Analyte Sequence: 1508078	Check Sample Analysis: ICPOE Tot. Rec.	Result*	<u>Units</u>	True	<u>%R</u>	<u>PQL</u>
Aluminum	IFA1	59,401.9	ug/L	60,000	99	50.0
	IFB1	59,982.4	ug/L	60,000	100	50.0
Beryllium	IFA1	-0.4	ug/L			5.00
	IFB1	99.6	ug/L	100	100	5.00
Calcium	IFA1	286,521.7	ug/L	300,000	96	250
	IFB1	287,344.0	ug/L	300,000	96	250
Iron	IFA1	236,042.4	ug/L	250,000	94	250
	IFB1	236,025.1	ug/L	250,000	94	250
Magnesium	IFA1	140,652.9	ug/L	150,000	94	250
	IFB1	142,177.2	ug/L	150,000	95	250
Manganese	IFA1	0.9	ug/L			5.00
	IFB1	196.6	ug/L	200	98	5.00
Potassium	IFA1	-341.8	ug/L			1000
	IFB1	20,611.2	ug/L	20,000	103	1000
Sodium	IFA1	50,577.6	ug/L	50,000	101	1000
	IFB1	50,806.4	ug/L	50,000	102	1000
Zinc	IFA1	0.1	ug/L			20.0
	IFB1	290.4	ug/L	300	97	20.0

^{*}Criteria = 80-120%R of True Value or+/- PQL

See raw data for complete analyte list and results.

Project Name:

A-098

TechLaw, Inc. - ESAT Region 8 Detection Limit (PQL) Standard ICPMS-PE DRC-II

Metals (Dissolved) by EPA 200/7000 Series Methods

Sequence: 1508069

<u>Analyte</u>	<u>True</u>	<u>Found</u>	<u>%R</u>	<u>Units</u>
Antimony	1.00	1.05	105	ug/L
Arsenic	2.00	2.04	102	ug/L
Barium	10.0	9.68	97	ug/L
Cadmium	0.200	0.206	103	ug/L
Chromium	2.00	1.79	89	ug/L
Cobalt	0.200	0.170	85	ug/L
Copper	1.00	1.01	101	ug/L
Lead	0.200	0.171	85	ug/L
Molybdenum	1.00	0.885	88	ug/L
Nickel	1.00	0.913	91	ug/L
Selenium	2.00	1.82	91	ug/L
Silver	1.00	0.956	96	ug/L
Thallium	1.00	0.891	89	ug/L
Vanadium	2.00	1.82	91	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

Project Name:

TechLaw, Inc. - ESAT Region 8

Detection Limit (PQL) Standard

ICPOE - PE Optima

Metals (Dissolved) by EPA 200/7000 Series Methods

Sequence: 1508068

' '				
<u>Analyte</u>	<u>True</u>	<u>Found</u>	<u>%R</u>	<u>Units</u>
Aluminum	100	111.8	112	ug/L
Beryllium	5.00	5.299	106	ug/L
Calcium	250	250.3	100	ug/L
Iron	100	95.01	95	ug/L
Magnesium	1000	1037	104	ug/L
Manganese	10.0	10.65	106	ug/L
Potassium	1000	1035	104	ug/L
Sodium	1000	1042	104	ug/L
Zinc	50.0	56.42	113	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

A-098

TechLaw, Inc. - ESAT Region 8 Detection Limit (PQL) Standard ICPMS-PE DRC-II

Metals (Total Recov) by EPA 200/7000 Series Methods

Sequence: 1508077

<u>Analyte</u>	True	<u>Found</u>	<u>%R</u>	<u>Units</u>
Antimony	1.00	1.047	105	ug/L
Arsenic	2.00	2.039	102	ug/L
Barium	10.0	9.677	97	ug/L
Cadmium	0.200	0.2062	103	ug/L
Chromium	2.00	1.786	89	ug/L
Cobalt	0.200	0.1701	85	ug/L
Copper	1.00	1.011	101	ug/L
Lead	0.200	0.1705	85	ug/L
Molybdenum	1.00	0.8850	88	ug/L
Nickel	1.00	0.9126	91	ug/L
Selenium	2.00	1.817	91	ug/L
Silver	1.00	0.9558	96	ug/L
Thallium	1.00	0.8908	89	ug/L
Vanadium	2.00	1.817	91	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%.No limits for Al, Ca, Fe, K, Mg & Na.

Project Name:

A-098

TechLaw, Inc. - ESAT Region 8 Detection Limit (PQL) Standard ICPOE - PE Optima

Metals (Total Recov) by EPA 200/7000 Series Methods

Sequence: 1508078

<u>Analyte</u>	<u>True</u>	<u>Found</u>	<u>%R</u>	<u>Units</u>
Aluminum	100	111.8	112	ug/L
Beryllium	5.00	5.299	106	ug/L
Calcium	250	250.3	100	ug/L
Iron	100	95.01	95	ug/L
Magnesium	1000	1037	104	ug/L
Manganese	10.0	10.65	106	ug/L
Potassium	1000	1035	104	ug/L
Sodium	1000	1042	104	ug/L
Zinc	50.0	56.42	113	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

Certificate of Analysis

TechLaw Inc., ESAT Region 8 INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 200.7 Dissolved Sequence ID#: 1508068

Instrument ID#: ICPOE	- PE Optima	Water	LSR #: A-096
Analysis ID	Sample Name	Analysis Date	Analysis Time
1508068-ICV1	Initial Cal Check	08/11/15	12:25
1508068-SCV1	Secondary Cal Check	08/11/15	12:28
1508068-ICB1	Initial Cal Blank	08/11/15	12:31
1508068-CRL1	Instrument RL Check	08/11/15	12:34
1508068-IFA1	Interference Check A	08/11/15	12:37
1508068-IFB1	Interference Check B	08/11/15	12:41
1508062-BLK1	Blank	08/11/15	12:45
1508062-BS1	Blank Spike	08/11/15	12:48
C150803-02	GKMSW01_081015	08/11/15	12:51
1508062-DUP1	Duplicate	08/11/15	12:54
1508068-SRD1	Serial Dilution	08/11/15	12:57
1508062-MS1	Matrix Spike	08/11/15	13:00
C150803-05	GKMSW02_081015	08/11/15	13:04
C150803-08	GKMSW04_081015	08/11/15	13:07
C150803-11	GKMSW05_081015	08/11/15	13:10
C150803-14	GKMSW11_080915	08/11/15	13:13
1508068-CCV1	Calibration Check	08/11/15	13:16
1508068-CCB1	Calibration Blank	08/11/15	13:19

TechLaw Inc., ESAT Region 8 INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 200.8 Dissolved Sequence ID#: 1508069

Instrument ID#: ICPMS	S-PE DRC-II	Water	LSR #: A-096
Analysis ID	Sample Name	Analysis Date	Analysis Time
1508069-ICV1	Initial Cal Check	08/11/15	12:39
1508069-SCV1	Secondary Cal Check	08/11/15	12:43
1508069-ICB1	Initial Cal Blank	08/11/15	12:46
1508069-CRL1	Instrument RL Check	08/11/15	12:49
1508069-IFA1	Interference Check A	08/11/15	12:53
1508069-IFB1	Interference Check B	08/11/15	12:56
1508063-BLK1	Blank	08/11/15	13:03
1508063-BS1	Blank Spike	08/11/15	13:06
C150803-02	GKMSW01_081015	08/11/15	13:09
1508063-DUP1	Duplicate	08/11/15	13:12
1508069-SRD1	Serial Dilution	08/11/15	13:15
1508063-MS1	Matrix Spike	08/11/15	13:18
C150803-05	GKMSW02_081015	08/11/15	13:21
C150803-08	GKMSW04_081015	08/11/15	13:24
C150803-11	GKMSW05_081015	08/11/15	13:27
C150803-14	GKMSW11_080915	08/11/15	13:30
1508069-CCV1	Calibration Check	08/11/15	13:33
1508069-CCB1	Calibration Blank	08/11/15	13:37

TDF #: A-098

TechLaw Inc., ESAT Region 8 INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 245.1 Total Sequence ID#: 1508072

Instrument ID#: CVAA F	FIMS - PE	Water	LSR #: A-096
Analysis ID	Sample Name	Analysis Date	Analysis Time
1508072-ICV1	Initial Cal Check	08/11/15	15:55
1508072-ICB1	Initial Cal Blank	08/11/15	15:55
1508072-SCV1	Secondary Cal Check	08/11/15	15:55
1508072-IBL1	Instrument Blank	08/11/15	15:55
1508071-BS1	Blank Spike	08/11/15	15:55
1508071-BLK1	Blank	08/11/15	15:55
C150803-01	GKMSW01_081015	08/11/15	15:55
1508071-DUP1	Duplicate	08/11/15	15:55
1508071-MS1	Matrix Spike	08/11/15	15:55
C150803-04	GKMSW02_081015	08/11/15	15:55
C150803-07	GKMSW04_081015	08/11/15	15:55
C150803-10	GKMSW05_081015	08/11/15	15:55
C150803-13	GKMSW11_080915	08/11/15	15:55
1508072-CCV1	Calibration Check	08/11/15	15:55
1508072-CCB1	Calibration Blank	08/11/15	15:55

TDF #: A-098

TechLaw Inc., ESAT Region 8 INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 150.1 WET Sequence ID#: 1508073

Instrument ID#: pH Meter	Water		LSR #: A-096	
Analysis ID	Sample Name	Analysis Date	Analysis Time	
C150803-03	GKMSW01_081015	08/11/15	16:29	
C150803-06	GKMSW02_081015	08/11/15	16:29	
C150803-09	GKMSW04_081015	08/11/15	16:29	
C150803-12	GKMSW05_081015	08/11/15	16:29	
C150803-15	GKMSW11 080915	08/11/15	16:29	

TDF #: A-098

TechLaw Inc., ESAT Region 8 INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: EPA 310.1 Total Sequence ID#: 1508074

Instrument ID#: Mettler A	Г Wa	ter	LSR #: A-096
Analysis ID	Sample Name	Analysis Date	Analysis Time
1508066-SRM1	Reference	08/11/15	16:32
1508066-BLK1	Blank	08/11/15	16:32
C150803-03	GKMSW01_081015	08/11/15	16:32
1508066-DUP1	Duplicate	08/11/15	16:32
C150803-06	GKMSW02_081015	08/11/15	16:32
C150803-09	GKMSW04_081015	08/11/15	16:32
C150803-12	GKMSW05_081015	08/11/15	16:32
C150803-15	GKMSW11_080915	08/11/15	16:32
1508074-CCV1	Calibration Check	08/11/15	16:32
1508074-CCB1	Calibration Blank	08/11/15	16:32

TechLaw Inc., ESAT Region 8 INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 200.8 Total Recoverable Sequence ID#: 1508077

Instrument ID#: ICPM	S-PE DRC-II V	Vater	LSR #: A-096
Analysis ID	Sample Name	Analysis Date	Analysis Time
1508077-ICV1	Initial Cal Check	08/11/15	12:39
1508077-SCV1	Secondary Cal Check	08/11/15	12:43
1508077-ICB1	Initial Cal Blank	08/11/15	12:46
1508077-CRL1	Instrument RL Check	08/11/15	12:49
1508077-IFA1	Interference Check A	08/11/15	12:53
1508077-IFB1	Interference Check B	08/11/15	12:56
1508077-CCV1	Calibration Check	08/11/15	13:33
1508077-CCB1	Calibration Blank	08/11/15	13:37
1508070-BLK2	Blank	08/11/15	16:17
C150803-01	GKMSW01_081015	08/11/15	16:20
1508070-DUP2	Duplicate	08/11/15	16:23
1508077-SRD1	Serial Dilution	08/11/15	16:26
1508070-SRM2	Reference	08/11/15	16:29
1508070-MS2	Matrix Spike	08/11/15	16:32
C150803-04	GKMSW02 081015	08/11/15	16:35
C150803-07	GKMSW04_081015	08/11/15	16:38
C150803-10	GKMSW05_081015	08/11/15	16:41
C150803-13	GKMSW11_080915	08/11/15	16:44
1508077-CCV2	Calibration Check	08/11/15	16:47
1508077-CCB2	Calibration Blank	08/11/15	16:51

TDF #: A-098

TechLaw Inc., ESAT Region 8 INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 200.7 Total Recoverable Sequence ID#: 1508078

Instrument ID#: ICPOR	E - PE Optima	Water	LSR #: A-096
Analysis ID	Sample Name	Analysis Date	Analysis Time
1508078-ICV1	Initial Cal Check	08/11/15	12:25
1508078-SCV1	Secondary Cal Check	08/11/15	12:28
1508078-ICB1	Initial Cal Blank	08/11/15	12:31
1508078-CRL1	Instrument RL Check	08/11/15	12:34
1508078-IFA1	Interference Check A	08/11/15	12:37
1508078-IFB1	Interference Check B	08/11/15	12:41
1508078-CCV1	Calibration Check	08/11/15	13:16
1508078-CCB1	Calibration Blank	08/11/15	13:19
1508070-BLK1	Blank	08/11/15	16:14
1508070-SRM1	Reference	08/11/15	16:17
C150803-01	GKMSW01_081015	08/11/15	16:20
1508070-DUP1	Duplicate	08/11/15	16:23
1508078-SRD1	Serial Dilution	08/11/15	16:26
1508070-MS1	Matrix Spike	08/11/15	16:30
C150803-04	GKMSW02 081015	08/11/15	16:33
C150803-07	GKMSW04_081015	08/11/15	16:36
C150803-10	GKMSW05_081015	08/11/15	16:58
C150803-13	GKMSW11_080915	08/11/15	17:01
1508078-CCV2	Calibration Check	08/11/15	17:04
1508078-CCB2	Calibration Blank	08/11/15	17:07